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which had never been surveyed. They had two sledges, twelve dogs, and equipment for seventy days. They started on April 2, 1905. The depot which had been made a year before had been entirely spoiled by bears, but Lieut. Hansen and his companion shot bears, seals, and reindeer and thus spun the journey out for eighty-four days. Excellent work was done. The east coast of Victoria Land was charted up to the 72nd parallel. The land formerly seen by Dr. Rae at the south end of Victoria Strait proved to be a group of over 100 small, low islands. They were charted on the way back. An interesting event of this journey was the meeting with another unknown Eskimo tribe, the "Kiilnermium Eskimo," whose hunting fields extend from the Coppermine River eastwards. These Eskimo, like the others mentioned by Amundsen, have no connection with civilization.

GEOGRAPHICAL RECORD.

AFRICA.

HANS VISCHER'S JOURNEY ACROSS THE SAHARA.—This gentleman, formerly a missionary in northern Nigeria, has added another to the remarkable trips across the Sahara that have been made within the past two years. His route was from Tripoli to Lake Chad. He left Tripoli in July last year accompanied by a number of Mecca pilgrims from northern Nigeria. He brought ten of them with their families safely through the desert. In the mountains of Gharian he found people living in subterranean dwellings. He obtained considerable information regarding the Senussi. He says that this great sect is constantly losing ground owing to the fact that the late Mahdi died without accomplishing anything. The Senussists always teach the people to believe that it is they who will restore Islam to its old position. He found many Senussi clubs in parts of the desert along his route. Each club is a centre of religious observances and makes an annual contribution of dates, camels, etc., to headquarters. The Senussists tolerate but do not support the Turkish Government. Mr. Vischer expresses the opinion that the danger from the Senussi movement lies chiefly in the fact that there is at present no leader strong enough to control the various factions.

MR. AUGUSTE CHEVALIER IN THE IVORY COAST COLONY.—This well-known French explorer is now engaged in the study of the agricultural and forest productions of the French colony. *La Géographie* (No. 3, 1907) says that the new railroad enabled him easily to penetrate the depths of the great virgin forest of that region. The facility and safety with which he can move about and pursue his studies contrasts brightly with the difficulties which Binger, Hostains, and other explorers met there years ago. They had to overcome many obstacles, chiefly the hostility of the natives, and their attention was so distracted from scientific work that their reports on the flora, fauna, and ethnography of the country were necessarily very imperfect.

The country to-day is pacific, the colonial authorities have the natives under excellent control, and scientific work is carried on with every chance of success. Mr. Chevalier has found three species of mahogany all belonging to the order *Meliaceæ* to which the American mahoganies also belong. The finest of these mahoganies is known on the Congo, in the Kamerouns, and in Nigeria, but is now first reported in French West Africa. The wood, he says, is of great beauty, and brings the highest price in the Liverpool market. In addition to mahogany he is finding other timber that may very profitably be exported.

FRUITS IN CAPE COLONY.—About three years ago New York began to receive fine fruits raised in parts of Cape Colony, which reach our market early in the spring, long before our own fruit trees blossom. This trade is expanding in New York and has reached large proportions in London. The fruit is sent in cold storage, and though, at first, much of it spoiled in transit, experience has demonstrated the practicability and great value of the trade. The *Agricultural Journal* of the Cape of Good Hope (April, 1907) has an article on the district of Stellenbosch, a great fruit and vine region, giving particular attention to the famous farm "Rustenberg," one of the great show fruit farms which make excellent profits on the fruit sent to the London market. The orchards contain many thousands of fruit trees, and the business is conducted on the principle that only the best varieties shall be produced and that of the best only the carefully selected shall be exported. Like most new industries, many failures were recorded at first, as the early efforts of fruit-growers were severely handicapped by lack of knowledge as to the varieties of fruit most suitable and acceptable in foreign markets. These problems have now been solved. Photographs of fruit-packing for export and other scenes are shown.

RAINFALL OF GERMAN SOUTHWEST AFRICA.—Important meteorological work is being carried on by the Germans in their possessions in Southwest Africa, as is evidenced by a discussion of the rainfall of that region, published in the "Wissenschaftliche Beihefte zum deutschen Kolonialblatte" (Band 20, Heft I. *Mitteilungen aus den deutschen Schutzgebieten. Die Niederschlagsverhältnisse von Deutsch-Südwestafrika.* Von Dr. F. von Danckelmann. Berlin, 1907). Dr. von Danckelmann has collected all available material from the territory with which he is concerned, and has added data from stations in adjacent parts of British and Portuguese possessions, for the sake of completeness. The means are reduced to the same period of time, and a series of charts presents the results very clearly. Along the coast it is practically rainless, the conditions being not unlike those along the desert west coast of South America. The prevailing winds along this African coast are southerly and southwesterly; and as they come off a cold ocean current, and are warming, they are dry, in spite of the fact that they are forced by the topography to climb over high land. The frequent coast fogs, like those along the arid west coast of South America, furnish some moisture to the land. The winter rains of the prevailing westerlies, found in the west of Cape Colony, do not reach north of the Orange River. The inland districts of German Southwest Africa have dry winters, with southwest winds, and a rainy season in summer, with easterly winds. Near Windhuk the mean annual rainfall is about 12 or 14 inches; in the far northeast it is over 25 inches. As this is a region of small precipitation, it is natural that the fluctuations in rainfall from year to year are great. At Windhuk the last twenty years have brought a year with 47 per cent. and a year with 210 per cent. of the annual mean. Heavy thunder-

storms and cloudbursts are the rule in summer. In 1900 the total rainfall at Udabis was 9.5 inches. On three consecutive days, 6.5 inches of this amount fell. It is obvious from this study of the rainfall that most of German Southwest Africa is not very favourably situated as regards human settlement.

R. DEC. W.

SECOND REPORT OF THE WELLCOME RESEARCH LABORATORIES AT KHARTUM.—This institution was founded to promote the scientific study of tropical disorders and technical education and to conduct investigations relating to water, food-stuffs, health, products, and other matters of practical interest in the development of the Sudan. The first report was issued in 1904. Since that time the record has been one of steady progress.

The second *Report* contains fourteen papers mostly of a technical nature, relating to human and animal pests and investigations concerning the products of the Sudan. The war upon the mosquito has been vigorously pushed in Khartum and in other parts of the Sudan. At Khartum, the *Anopheles* mosquito, believed to be the cause of malaria, has been practically destroyed. The tsetse fly and other noxious insects are being studied by agents of the laboratories throughout the Sudan, and special attention is now given to the matter of locust destruction—a very important question for farmers, as these insects have done great damage in some districts. Various diseases, affecting both human beings and domestic animals, are the subject of long reports. The publications of these laboratories are to-day among the most valuable results of scientific research relating to tropical conditions as affecting human and animal life and industries.

AMERICA.

PROGRESS OF SURVEYS IN ALASKA IN 1906.—The *Report* on the progress of investigations of Alaskan mineral resources in 1906 by Mr. Alfred H. Brooks and his assistants is published as *Bulletin* No. 314 of the U. S. Geological Survey. Fourteen parties were in the field from two and a half to six months. The aggregate areas covered by geologic reconnaissance surveys were 9,000 square miles; by detailed geologic surveys, 5,048 square miles; by topographic reconnaissance surveys, 200 square miles. The area of Alaska is 586,400 square miles. The *Report* shows that nearly 500,000 square miles have yet to be covered by geologic reconnaissance surveys. Until this work is much further advanced all generalizations on the distribution of the mineral wealth must remain largely hypothetical.

Preliminary topographic surveys, including about 50,000 square miles covered by the Coast and Geodetic Survey and other Government Bureaus, have been carried over less than a quarter of the entire area of Alaska. The importance of the rapid extension of these surveys is very great, for they are not only a guide to the prospector but are essential to all engineering enterprises. Thus far, nearly \$500,000 have been spent on Alaskan surveys and investigations; but this is only about one-half of 1 per cent. of the value of the gold output during the same period.

A STUDY OF EVAPORATION AT SALTON SEA.—A conference committee from the U. S. Geological Survey, the Weather Bureau and the Reclamation Service has prepared a plan for the study of evaporation at Salton Sea (*Bull.*, 1906, p. 261) to be carried on under the direction of Prof. Frank Bigelow of the Weather Bureau and Dr. G. K. Gilbert of the Geological Survey.

Here is an inland sea, suddenly created in an old basin, in a warm climate, where evaporation is great, and without any important water supply in the future. The restoration of the Colorado River to its old channel has practically cut off influx to the sea. The water which remains can readily be measured and accounted for, and in order to determine the evaporation it will merely be necessary to observe the rate of recession of the lake and to take account of the attendant climatological phenomena.

The recommendations, in brief, are that the observations be continued over several years, and that they be undertaken as soon as possible after the summer floods of 1907, provided that the protective structures built to force the Colorado River into its normal channel withstand these floods, thereby indicating that the evaporation studies will not be interrupted by further extensive additions of Colorado River water. Supplementary studies of the character of the basin, inflow of surface waters and sub-surface waters and of engineering and geologic questions that may arise, will be carried on by the Geological Survey.

INVESTIGATION OF THE ATLANTIC AND COASTAL PLAIN.—Several State surveys, including North Carolina, Georgia, Alabama, and Mississippi, have arranged to co-operate with the U. S. Geological Survey in a detailed investigation of the stratigraphy and paleontology of the Atlantic and Gulf Coastal Plain. The aim is to determine the extent of the subdivisions recognized in New Jersey and Maryland on the north and Alabama on the south, to ascertain their relations to one another and to establish satisfactory correlations throughout the district between the Potomac and the Mississippi. Incidentally, economic studies, especially of phosphates, will be made. The State Geologists in the Coastal Plain districts and the chief geologist and chief hydrographer for the national Survey, with Dr. W. B. Clark as chairman, will supervise the work. Mr. M. L. Fuller, in charge of the field work, will put seven parties in the field this summer. It is hoped to complete the investigation in Virginia, North Carolina, South Carolina, and Florida during the next year, and to finish the work in the remaining States in 1908 and 1909.

REPORT ON MARYLAND COUNTIES.—Maryland is to be congratulated on the admirable series of practical and scientific reports in which the investigations of her Geological Survey are recorded. The latest publications of the Survey are two volumes on the physical features of Calvert County and St. Mary's County, respectively. They are the fourth and fifth volumes in a series of reports on the resources of the counties. Each volume treats the county with relation to the history of geographical and geological research—physiography, geology, economic resources, soils, climate, hydrography, magnetic declination, and forests. Indices make all the information easily available. Large-scale, topographical, geological, and agricultural soil maps accompany the volumes. The information contained in these reports cannot fail to prove of both economic and educational value to the residents of the counties as well as to all who desire detailed data concerning the State. The reports are illustrated with photographs.

SUMMER FIELD MEETING NEAR LAKE CHAMPLAIN.—Section E of the American Association for the Advancement of Science will hold a summer field meeting, July 3-10, in New York State, in the region between Lake Champlain and the Adirondacks. Dr. John M. Clarke has planned the meeting so that visiting geologists will see as much as possible of this extremely interesting region. He will give a paper on "Lake Champlain," including an account of the work of the

State in the Champlain valley, which is classic ground in the history of American geology. Plattsburg will be the headquarters of the meeting, which will be primarily for field excursions, though Dr. Lane, the retiring Vice-President, will deliver his presidential address, and a number of papers are expected.

THE CLIMATE OF KANSAS.—No. I, Vol. XXXV, 1907, of the *Monthly Weather Review* contains a stenographic report of the testimony given by Professor Willis L. Moore, Chief of the Weather Bureau, at a hearing before the Committee on Agriculture of the House of Representatives at Washington, D. C., January 8, 1907, together with a supplementary statement written by Professor Moore in order to counteract the impression created by erroneous newspaper reports of his testimony. The available records of rainfall in Kansas and Nebraska have been collected and examined. Taking thirty years of data, and dividing this period into three periods of ten years each, it is seen that the first and last ten years were periods of fairly abundant rainfall, and that the middle period was one of deficient rainfall. Furthermore, there is practically no difference between the precipitation of the first ten years and that of the last ten years. In 1906 heavy rains were common over a vast extent of territory west of the 95th meridian. The wind records show that the last fifteen years have not shown quite as much wind movement as the fifteen years previous, but it is obviously unsafe to assume that a permanent decrease in wind velocity is taking place. Professor Moore, in his testimony before the Committee, said regarding the present long period of abundant rainfall over the Plains, that he confidently looked for "as long a period of drought;" "that the time is now coming when we will have to go through a drought and a shortage of crops."

R. DEC. W.

STATISTICAL ABSTRACT OF THE UNITED STATES FOR 1906.—This annual, issued by the Department of Commerce and Labor, increases in value with every new issue. The 29th volume is equalled by none of its predecessors in the variety of information covered. The facts relating to our area and population, finance, commerce, manufactures and mining, agriculture, prices of commodities, transportation, merchant marine, and other important topics that can have adequate expression in statistical form are given. The export and import relations of all the more important countries with the United States from 1865 to 1906 are detailed. The commercial movement of each of our seaports is given for the past seventeen years. Forty-one pages are devoted to one table recording the progress of the United States from 1800 to the present time and from a large number of points of view.

Fourteen pages are filled with the commercial and financial statistics of the principal countries of the world. We have no handbook relating to the material interests of the United States that is so helpful for daily reference as this one.

ARCHÆOLOGY AT PHILLIPS ACADEMY, ANDOVER.—This well-known academy is the only preparatory school in the world that possesses a fine museum and a Department of Archæology. It has recently issued *Bulletin* 3, giving a brief history of archæology at Phillips Academy and a narrative of explorations in various parts of our country. The volume contains many photographs showing specimens of early potteries and other objects, collectors at their work in the field, the fine building occupied by the Department, etc.

An article on "Mound Exploration," printed in the *Philadelphia Press* in 1895, led to correspondence between Mr. Robert S. Peabody of Germantown, Pa., an enthusiastic collector of archæological specimens and the writer of the article.

The result of this correspondence was that in 1901 Mr. Peabody and his wife founded the Department of Archæology at Phillips. The endowment was sufficient for future maintenance and for the erection of a beautiful building suitable for museum purposes and containing a large lecture-hall, a library, and offices. Mr. Peabody's entire collection, numbering some 38,000 specimens, is now in this building; and on Oct. 10, 1906, the specimens in the museum numbered 55,938. Thus far 114 students have taken the course in American archæology. The volume describes the field work done for Mr. Peabody and also the explorations conducted by the Department since 1901, and as yet unpublished.

THE CLIMATE OF YUKON TERRITORY.—MR. R. F. Stupart, Director of the Meteorological Service of Canada, contributes to the *Monthly Weather Review* (Vol. XXXV, No. 1) a paper on *The Climate of Yukon Territory*, based on all available records. Meteorological observations were begun in November, 1895, and have been taken at Fort Constantine, Dawson, Selkirk, Tagish Lake, and White Horse. There is further available the record from Atlin, B. C., 25 miles south of the boundary, beginning with August, 1905. It appears that the northern and eastern portions of Yukon have warmer summers than the more southerly portions, probably because the former are at a lower level; are farther from the westerly winds blowing from the Pacific, and are generally protected by mountains from 5,000 to 10,000 feet high. At Dawson the January mean temperature is about -24° Fahr. The absolute minimum is -68° . July has a mean of $60^{\circ}.4$, and the weather is quite comparable with that of the same month in southern Alberta. The longer days in the former locality probably give more rapid growth than in the latter. There are some few instances of a temperature record of 90° . The annual snowfall in the Yukon is about 52 inches, and the rainfall 7.5 inches. July, August, and September are the months of maximum precipitation, much of the rain coming in thunderstorms. There is little wind at Dawson in winter. Cyclones pass far to the southward, and the pressure gradients are usually weak.

R. DEC. W.

CONDITIONS OF NAVIGATION IN HUDSON BAY.—In Mr. A. P. Low's report on his expedition to Hudson Bay and the Arctic Islands in the *Neptune* in 1903-04 he summarizes the evidence concerning navigation in Hudson Strait and Hudson Bay. These waters do not freeze solid, but are so covered with floating ice as to be unnavigable for at least seven months in the year. The ice does not begin to melt until well into June, and is not sufficiently melted for safe navigation until the middle of July. The ice formed in the Strait and Bay is not sufficiently heavy to obstruct ordinary navigation until the latter part of November. The period of safe navigation for ordinary iron steamships to the port of Churchill may be taken to extend from July 20th to November 1. This period might be increased by a week in the beginning of the season, and by perhaps two weeks at the close.

The distance from Churchill, the proposed terminus on Hudson Bay of the railroad from the Canadian prairie wheat-fields, to Liverpool is almost the same as that from Montreal to Liverpool. Consequently there will be a saving in distance of 1,000 miles of rail or river carriage in favour of the northern route. Given a good harbour, such as that at Churchill, and an adequate number of steamships, there will be no difficulty in removing from that port during the season of safe navigation all the grain and other supplies that can be drawn there by a single line of rails.

CLIMATE OF NEW MEXICO.—There has thus far been little study of the climate of New Mexico. The "Report on the Climate of New Mexico, with particular Reference to Questions of Irrigation and Water Storage in the Arid Region," by Gen. A. W. Greely and Lieut. W. A. Glassford (Ex. Doc. No. 287. H. R., 51st Congress, 2d Session), published in 1891, is the only discussion of any considerable account. The Report of the Governor of New Mexico to the Secretary of the Interior for 1895 contained a few pages on the climate of the territory. And there have been a few scattering, shorter articles on the same subject. The most recent publication, "Forty Years of Southern New Mexico Climate," appears as *Bulletin* No. 59, New Mexico College of Agriculture and the Mechanic Arts, Agricultural Experiment Station. This was prepared by J. D. Tinsley, Soil Physicist and Meteorologist of the Experiment Station; embraces 43 octavo pages, and contains the meteorological observations made at the station from 1892 to 1905 inclusive, together with the temperature and rainfall records at other stations in the Mesilla Valley between 1851 and 1890, previously published in Gen. Greely's Report above referred to. The new data, for the Experiment Station, are the monthly and annual mean maximum, mean minimum and mean temperatures; highest and lowest temperatures during each month; number of days with temperature of 32 or less; number of days with temperature of 60 or less; precipitation; relative humidity, state of sky, and wind movement, for each month and year. These data have general application to those parts of southern New Mexico at altitudes of less than 4,000 feet.

The annual mean maximum at the Experiment Station is 76.8° in fourteen years. The annual mean minimum for thirteen years is 41.4° and the annual mean for forty years is 61.6° . The lowest temperature in fourteen years was 1° in December, 1895, and the highest, 106° , which has occurred several times. Temperatures of 10° and less are not uncommon at night in December, January, and February. The mean annual range of temperature is 35.4° . The absolute monthly range is from 45° to 75° . The greatest annual range was 101° , in 1895. The mean annual rainfall is 8.8 inches. The smallest was 3.5 inches in 1873, and the largest, 17.1 inches in 1905. The rainiest months are July, August, and September. Snow falls, but the amount is too small to be of economic importance. "The records," the *Bulletin* says, "scarcely sustain the idea that there has been a permanent increase in the rainfall." The annual mean of relative humidity is about 40 per cent. The average number of clear days a year is 225; partly cloudy, 91; and cloudy, 49. The evaporation is 5 to 6 feet a year.

R. DEC. W.

THE RAILROAD OVER THE PERUVIAN ANDES.—The *Consular Reports* say that six engineering parties this spring are selecting the route down the Atlantic slope of the Peruvian Andes for the railroad that is to connect the Amazon with the Pacific. Henry Meiggs built the western third of this railroad from Callao to Oroya, which is 220 miles by rail from the Pacific coast. Oroya is the starting-point of the line that is now to be built through the eastern ranges of the Andes and down the eastern slope. At last accounts, the survey on one of the six sections of the line had been completed, it was well advanced on the others, and building operations were to begin this year. The engineers say that a very large expenditure of labour and money will be required, but the entire route is now known to be feasible. The track will extend to the Ucayali, on whose navigable waters passengers and freight will pass to and from the ocean vessels that ascend the Amazon, 2,000 miles, to the river port of Iquitos. It is expected that this

enterprise will give an impetus to the development of the eastern territories of Peru known as the Montaña and embracing about 500,000 square miles.

ASIA.

THE STUDY OF HIMALAYAN GLACIERS.—The Commission Internationale des Glaciers in 1905 called the attention of the Geological Survey of India to the importance of recording data for determining the secular movements of the principal Himalayan glaciers. Five officers of the Survey were therefore deputed during August and September last year to make a preliminary survey of the principal glaciers in the Kumaon, Lahaul, and Kashmir regions. Twelve glaciers were examined, and photographs were taken showing the state of the glaciers and of the principal masses of moraine material at the time of the visit. These photographs will enable travellers to form an idea of any changes that may occur in the interval, and thus make the observations of value, even if the fixed points cut in the rocks are obliterated. Reports of the work with plane-table sketches and photographs will be published for the use of travellers in the three regions. It was found that the glaciers of the Hunza valley and the Karakoram range generally descend to lower altitudes than in the Lahaul and Kumaon regions. In the former region the foot of the glaciers descends to levels of 7,000 or 8,000 feet, while in the latter region it melts before descending below 11,000 feet. There was prominent evidence of general retreat shown by old moraines (sometimes grass-covered) at lower levels in the valleys. This, of course, does not necessarily mean that the glaciers are now in retreat, and two cases of recent advance were found in the Yengutsa and Hassanabad glaciers.—(*Records of the Geol. Survey of India, Vol. XXXV, Part I.*)

CLIMATE OF BUITENZORG, JAVA.—The *Meteorologische Zeitschrift* for March, 1907, reprints some interesting extracts from a book of Haberlandt entitled "Eine botanische Tropenreise" (Leipzig, 1903), in which various climatic characteristics of Buitenzorg are clearly brought out. The daily thunderstorms are accompanied by continuous thunder and lightning, and some of the trees in the famous Botanical Gardens of Buitenzorg are struck every year. The lightning strokes hardly ever set fires; houses are never injured, and are not provided with lightning rods; the strokes rarely do mechanical damage. Trees struck by lightning show no splintering or tearing; after a few days the leaves gradually change colour and the tree dies.

The lowest temperature varies between 70° and 73.5°. The bright, fresh, sunny morning is wonderfully attractive in the early hours. During the morning the temperature rises to between 84° and 88°, the maximum coming between 1 and 2 P. M. About noon come the first cool gusts of wind. During the afternoon the temperature falls with increasing cloudiness and rainfall to 73.5°-77°. Then Europeans change their clothing. The light tropical attire of morning, which is kept on during the early afternoon hours, while every one indulges in a siesta and the thunderstorm is in progress, is replaced by a light woollen suit, of dark colour, and in this the evening stroll or drive is taken. On these drives a light overcoat is not superfluous. After sunset the temperature falls slowly to the minimum. At dawn, while half asleep, one frequently feels chilly, and pulls up the bed-covering more closely. When these same temperatures are experienced in sleeping-rooms in Europe, people find it difficult to secure a night's rest because of the heat. The body soon adjusts itself to the continuous high temperatures and high

relative humidity of the tropics, and becomes very sensitive to slight temperature changes. This is true of natives as well as Europeans. Professor Haberlandt did not find that the high temperatures made him feel the need of the cooling incident to taking a cold bath. The Dutch in Java fear the excessive loss of body-heat which a cold bath produces, and believe that the chill which follows too long a time spent in a cold bath is apt to be followed by fever. The author found no discomfort as regards the temperature when, after several months' stay in Buitenzorg, he went to live at a higher altitude, where the temperature at sunrise was only 57° - 59° . Dutch residents who have been in Java for several years do not hesitate to go back to Holland in winter. The daily thunderstorms, so well described by many previous travellers, and especially by Junguhn, attract the attention of Professor Haberlandt, who gives a vivid account of the tremendous downpours of rain; the rapid swelling of the streams, and the grandeur of the clouds and lightning.

The sky in Java is not of the deep blue which most people associate with the tropics, but is pale, on account of the large amount of water vapour in the air, often condensed into light clouds or fogs. The light of the sky is very strong, and vegetation is markedly controlled by it. "On the verandas the lamps are lighted between 6 and 7 P. M., and then you enjoy with a calm satisfaction the wonderful tropical evening, which combines the charm of a mild summer night with the comfort of a long winter evening."

R. DEC. W.

ARCHÆOLOGY IN CHINESE TURKESTAN.—According to the London *Times* for May 31, letters dated Lop-Nor, February 18, have been received from Dr. M. A. Stein concerning the progress of his archæological investigations in the Lop or Tarim basin of Chinese Turkestan. Since last October he has pushed eastward from Keriya to Lop-Nor along the narrow zone of vegetation which encircles the deserts of Takla-makan and Lop. The zone, in this part of its course, lies at the foot of the Kwen Lun Mountains, the great range on the northern border of Tibet, whence flow the few streams which alone make human habitation possible in the desert basin of Lop. In the zone of vegetation, or in the desert a little north of the zone, Stein has carried on excavations at four chief sites during the past winter. The most western of the sites described in the present letters is located far out in the sandy desert sixty miles north of the modern oasis of Niya in the zone of vegetation. Stein there cleared nearly thirty dwellings in addition to those which he investigated in 1901. Large numbers of wooden tablets were found inscribed in the Kharosthi script peculiar to the extreme northwest of India not far from the beginning of our era, and introduced thence, apparently, into Chinese Turkestan. Sanskrit documents were also obtained, together with Græco-Roman intaglios and Chinese seals, showing that influences from far to the south, the west, and the east had penetrated to the very centre of Asia seven-teen centuries or more ago.

Farther east at Enderh (Tuholo) Dr. Stein's work brought to light a still further collection of Kharosthi records on wood, which clearly belong to the close of the third century of our era or thereabouts. At the time of his earlier visit he discovered epigraphical records in the Tibetan language dating from about the beginning of the eighth century. It thus appears that four or five centuries after its abandonment in the third century the site was reoccupied, only, as it seems, to be abandoned again during the Tibetan invasion which followed not long after. At Cherchen, still farther east, there appears to have been a similar abandonment

of an ancient town during the sixth century, followed by reoccupation a century or two later. The town was inhabited at the time of Marco Polo, about 1300 A. D., but was abandoned later, and again revived about 1830 or 1840. About two hundred miles east of Cherchen lies Miran, close to the famous lake or swamp of Lop-Nor, and not far from the eastern end of the zone of vegetation. It was an important site in former times, as it guarded not only the road from Turkestan to Tibet, but also the far more important trade-route from the West to China. Its ruins are remarkable for the large number of religious structures. Stein's excavations brought to light Kharosthi documents on wood and numerous paintings and stucco reliefs showing the influence of Indian art on the one hand and of Græco-Roman art on the other. The inscriptions prove that the town was occupied by the race which peopled Niya and other parts of the Lop basin far to the west. Like most of the ruins of Chinese Turkestan, it was abandoned in the third century of the Christian era. A complete clearing of the large ruined fort brought to light nearly a thousand Tibetan records, which show that, after remaining deserted for four or five centuries, the town was reoccupied in the same fashion and at the same time as Cherchen and Enderreh.

Nearly a hundred miles north of Miran the ruins of Lulan cover a broad area on the north side of the salt plain which once formed the bed of the expanded Lop-Nor of ancient times. The earliest human relics in this region consist of flints and crude pottery dating from an unknown but very early period. Here, as at all the other sites, Stein found Kharosthi documents fixing the date of the abandonment of the main ruins at about the end of the third century. The style of the architecture and of the carvings upon wood, the form of the shrines, and the nature of the objects of ordinary household use proved to be the same as in the ruins from 500 to 800 miles away on the south side of the Lop basin. Chinese influence was evidently stronger here than there, but the main mass of the people belonged to the same race.

Dr. Stein's investigations, together with those of LeCoq, described in a recent number of the *BULLETIN*, have greatly increased our knowledge of the archæology and history of Central Asia. It appears that at the beginning of our era the Lop basin and the neighbouring regions, such as Turfan, were much more densely populated than at present. The manner of life of the people appears to have been almost identical with that of to-day, although, on the whole, the state of civilization was higher. Then, as now, many of the houses were built of reeds, poplars, and tamarisks woven or tied most skilfully without the use of nails. Many places where agriculture was then possible are to-day either absolutely uninhabitable or are capable of sustaining no human population except wandering shepherds. A great change evidently came over the country during the first two or three hundred years of the Christian era, causing the abandonment of many towns which had previously boasted of a high degree of prosperity. After a few centuries of desertion, a number of these places were reoccupied, but never attained any great degree of prosperity or any great density of population. It is noteworthy that changes of the same sort took place at this time not only in Chinese Turkestan, but in other parts of Asia thousands of miles away. This fact, joined with the apparent impossibility of restoring the ancient prosperity by reason of the present lack of water, has led some observers to the conclusion that the abandonment and reoccupation of the ruins and the accompanying wars and invasions were due largely to changes of climate. The conclusions of Dr. Stein upon this subject may be expected to prove of great interest.

E. H.

AUSTRALIA.

GEOLOGICAL SURVEYS IN WESTERN AUSTRALIA.—The Geological Survey of Western Australia is making, under the direction of Mr. A. Gibb Maitland, Government Geologist, a series of special reports on the different mining fields of the State. The latest gives the results of Mr. C. G. Gibson's investigation of the Mount Margaret gold field, published as *Bulletin* 24. This district was formerly included in the North Coolgardie Field, from which it was separated in 1897. It embraces an area of 42,252 square miles. The first mention of this district is found in the journal of Sir John Forrest when he was searching for the remains of Dr. Leichhardt in 1869. He discovered and named Mount Margaret, but saw nothing that suggested the presence of gold which has since made this district one of the most important mining regions of Western Australia. The report is accompanied by a series of geological and mining plans and maps.

EUROPE.

THE MONT BLANC RAILROAD.—The Geneva correspondent of a London newspaper writes that French engineers have already constructed the permanent way of the Mont Blanc railway as far as Mont Lachat, 7,000 feet above the sea, or nearly half way to the top, and as soon as the rolling stock is ready the first section of the line will be opened. The other stations are: Rognes, 8,135 feet; Tête Rousse, 10,550 feet; Aiguille du Goûter, 12,000 feet; and Dome du Goûter, 13,473 feet. Up to 8,220 feet, the roadway will be in the open, commanding magnificent views. From this altitude to 11,900 feet, the trains will pass through a gallery bored in the mountain side and having frequent openings in the rock. From 11,900 feet to the summit, a tunnel will be driven under the glaciers so as to protect the line from avalanches. This part of the line will take many years to construct; but meanwhile a path will be laid from the summit of the Aiguille du Goûter, so that tourists may reach the top by sledge without danger or fatigue.

LOCAL CLIMATOLOGY OF THE SWISS VALAIS.—An instructive paper on "The Swiss Valais: A Study in Regional Geography," by Marion I. Newbegin (*Scot. Geogr. Mag.*, April, 1907), emphasizes several noteworthy points in the local climatology of the Canton Valais. The rainfall is not directly dependent on altitude, but is controlled by the general trend of the valley of the Rhone. Up as far as Martigny the valley is exposed to cold, rainy northwest and west winds; while above the bend at Martigny these wind directions are rare, being replaced by warmer and drier southwest winds, which enter the valley from a higher altitude, and therefore have somewhat of a foehn character. The distribution of the beech trees is closely controlled by the rainfall, these trees extending up the Rhone valley as far as the westerly winds from the Lake of Geneva penetrate—*i. e.*, throughout the area where the damper climate prevails. The effect of the winter invasions of temperature, characteristic of all mountain regions, is especially striking. The flat valley floor is on this account unsuitable for human habitations, and there is a general tendency for houses to be located along the sides of the valley rather than on the floor. The frequency of autumnal inversions makes it possible for the inhabitants to ascend to considerable elevations and yet enjoy comparatively mild temperatures. The direction of the upper part of the valley, which allows the sun to shine for a much longer period than would be possible in an east-and-west valley, is an important factor in producing unusual conditions of warmth there. The portion of the valley below Martigny is subject

to frequent and often violent winds. The large percentage of calms makes it possible to use places of relatively great elevation as health resorts, but it also makes it impossible for foreigners to live with comfort on the floor of the Rhone in summer.

The high temperatures over much of the Canton lead to the growth of plants of Mediterranean character. The small rainfall limits the growth of deciduous trees. The steppe-like conditions produced by the strong insolation and low precipitation are counteracted by a system of irrigation depending on the melting of ice and snow.

R. DEC. W.

THIRD CENTENARY OF BENTO DE GOES.—The Lisbon Geographical Society celebrated on April 11 the third centenary of the death of Bento de Goes, the illustrious Portuguese traveller of the seventeenth century. The journey that perpetuated his name extended from Goa, the Portuguese port in West India, northward between the Western Ghats and the Indian Ocean through the Punjab, Cabul and the Pamir, thence eastward through eastern Turkestan, to Turfan and Suchow, south of the Gobi waste. The countries and peoples he visited were largely unknown, and his observations threw a great deal of light upon them. The *Boletim* of the Lisbon Society is printing the history of his travels; and the Society issued a special pamphlet on the occasion of the explorer's anniversary, containing a sketch of his life and work by Augusto Ribeiro and an account of his itinerary and maps by Ernesto de Vasconcellos.

OCEANOGRAPHY.

THE PHILIPPINES TROUGH.—The German survey vessel *Planet*, in her recent voyage from Matupi to Manila by way of Nusa, Yap, and the Palau Islands (Jan. 5-Feb. 8, 1907), made 36 soundings in the waters just east of the Philippines, from the southern part of Mindanao to Luzon, north of the latitude of Manila. Here was found a deep trough, like those along the Aleutian and Japanese Islands. The existence of this trough was established by soundings in four cross sections. It is from 8,000 to 9,000 meters in depth, and extends along the east coast from Mindanao to San Bernardino Strait, which separates Samar from Luzon. Its distance from the coast is 25 to 45 nautical miles. The greatest ascertained depth of the Philippines Trough (Philippinengraben) was in the southern part, where a depth of 8,554 meters was attained without reaching bottom, and in the north about 8,900 meters, where bottom was reached with only 63 meters of the line remaining on the ship. The slope from the coast is very steep, the angle of slope in the north being eleven degrees (8,900 meters in twenty-five sea miles). These facts and a chart of the survey are given in the *Annalen der Hydrographie* No. 5, 1907.

POLAR.

THE BELGIAN SOUTH POLAR EXPEDITION.—The preparations for the new Belgian Antarctic expedition, which is to be headed by Dr. H. Arctowski, are said to be making excellent progress. It is estimated that the entire cost of the enterprise will be 800,000 francs, of which a wealthy patron in Brussels has contributed 200,000 and the city of Antwerp 250,000 francs. Dr. Arctowski does not expect to start until 1909, and his scientific programme in the Antarctic will occupy him two years. The *Geographischer Anzeiger* says that one of his chief purposes will be, if possible, to ascertain whether there is a land connection between Graham Land and King Edward VII Land.

PRINCE CHARLES FORELAND, SPITZBERGEN.—Dr. William S. Bruce, according to the *Scottish Geographical Magazine*, has sailed to the polar regions for the eighth time. He is making a second expedition to Prince Charles Foreland, Spitzbergen, to complete his topographical survey of the island and his study of its geology, fauna, and flora. He hopes to extend the hydrographical survey in Foreland Sound, and, if possible, to fix the edge of the continental shelf. A special steamer was chartered for the expedition, and it is supposed that the party landed on Prince Charles Foreland about June 8. The steamer will not await the completion of the work; the expedition will be taken back to Europe by the Prince of Monaco on board his yacht, the *Princesse Alice*.

GILLIS LAND.—A German named Cerner is reported in the public press as expecting to lead an expedition to northeast Spitzbergen to locate Gillis Land. It is the general opinion, however, that this question was settled by Dr. Nathorst in his Arctic expedition of 1898. Few regions in the far north have ever been the subject of so much misunderstanding as Gillis Land.

Captain Cornelis Gilies, a Dutch sailor, found an island to the east of N. E. Spitzbergen in 1707. He said it was about 100 miles (25 Dutch miles) east of Spitzbergen. In his day, longitudes were often miscalculated, and it is believed that the island he saw is now more than fifty miles from the archipelago.

His name was given to the island, but is commonly printed Gillis Land. It has also two other names, bestowed by two of the three men who have seen the island since Gilies introduced it to notice. In 1863 Captain Carlsen, and in 1864 Captain Tobiesen, declared that they saw Gillis Land; but it was found later that what they saw was King Charles Land, farther south. Others who reported that they had visited Gillis Land were shown instead to have called at Wiche Island. Petermann helped to intensify the confusion by disparaging Van Keulen's chart on which Gillis Land first appeared and placing the island on his maps ninety miles further north, on the authority of Mr. Barrington. Sir Clements Markham found, years later, that Barrington really agreed with the old Dutch chart, but the change suggested by Dr. Petermann appeared for years on German Arctic charts. The Germans recently have replaced the island on their maps in its old position.

When Jackson spent three years in Franz Josef Land, he sought for Gillis Land to the west; but, misled by the erroneous longitude of its discoverer, he came home declaring that the island did not exist in its assigned position.

Gillis Land was rediscovered by Captain Kjeldsen in 1876. He found it in 80° 10' N., the latitude of Van Keulen's chart, and about 32° E. It was wrapped in snow and ice, and he named it White Island. It was seen again in 1883 by Captain Johannesen, who named it New Iceland and fixed the position of its southwestern point in 80° 10' N. and 32° 3' E.

Dr. Nathorst, who circumnavigated the island in 1898, made a landing on it and described it as a land-mass of remarkable beauty, rising in regular curves to a height of about 700 feet and perfectly white with snow from the summit to the sea edge. The island figures on the latest Stieler chart as "White Island (Gillis Land)."

VARIOUS.

ABRASION BY GLACIERS, RIVERS, AND WAVES.—Under the above title Lewis G. Westgate discusses the details in form of those surfaces which have been subjected to erosion by glaciers, rivers, and waves, and presents certain conclusions re-

garding the manner in which the erosion is effected (*Journal of Geology*, XV, 1907, 113-120). Corrasion, including all mechanical wear by streams, glaciers, or waves, is subdivided into the two processes "abrasion" and "plucking," the former meaning the mechanical wear effected by tools, the latter the removal of rock fragments. The author then shows that those surfaces over which glaciers have moved are not uniformly smooth or sub-even, but more often "hackly" and showing good evidence of joint control in the details of form. An examination of stream beds often shows the same character, although cases are noted where the channel is quite smooth. The same effect of joint control was likewise noted at the only point where the author made a study of wave action. On the basis of these observations it is concluded that abrasion, or the wear effected by the transported material (tools) of glaciers, rivers, and waves is an unimportant factor, since abrasion should leave a smooth or sub-even surface. Plucking, or the removal of rock fragments, the only other factor in corrasion, is then shown to be of doubtful effectiveness; whence it is concluded that streams, and to a certain extent glaciers and waves, are transporting and not corradng agents. Weathering becomes the important factor, the transporting agent mainly serving to remove the materials, and so prevent clogging.

There are several reasons why Professor Westgate's analysis does not appear convincing. One cannot feel sure that abrasion must produce a smooth surface, and hence that rough surfaces cannot be to any considerable extent the results of abrasion. On the contrary, there is good reason to believe that, under certain conditions, an abrasion surface will necessarily be rough. A piece of fine sandpaper drawn across a table top will produce a smooth surface in course of time. A hob-nailed boot drawn across the table, under the weight of a heavy man, will produce a rough surface. The character of the abrading agent may affect the case. A heavy weight dragged across a wooden floor would leave the floor uninjured; but the same weight dragged across a tiled hearth might force some of the tiles from their places. The character of the surface abraded is an important factor to be considered. It is quite conceivable that a great glacier, armed with fragmentary débris frozen in its base, and grinding over a surface of jointed rock, might tear joint block after joint block from its place, the planes of fracture being quite often the planes of weakness due to joint structure. This is certainly abrasion; and yet the residual surface would not be smooth, but hackly and the details joint-controlled.

The ineffectiveness of waves which attack a vertical cliff descending abruptly into deep water, under conditions which give the waves no tools to work with, has often been noted. On the contrary, waves armed with boulders actively undermine cliffs of hard rock, producing the characteristic notch often seen at the base of such cliffs. Contrary to the author's belief that the bombardment of a cliff during a heavy storm would not seriously affect it, the pronounced effect of storm waves upon natural cliffs and walls of masonry is well known to those who live along the sea. Such a bombardment breaks off fragments of rock from the base of the cliff, and the breaking is most apt to take place along joint planes. Abrasion is the effective agent; yet the resulting surface is rough and joint-controlled. In the same manner it may be doubted whether we are wrong in believing that a stream laden with some sediment is a much more effective erosive agent than a stream which has no tools to work with. Those who have listened to a mountain torrent during a flood, rolling heavy boulders along its rocky channel with dull, booming concussions, will expect such abrasion by a young stream to do effective

work, yet leave a rough surface. The decreasing effect of abrasion during maturity and old age is well known and streams in these stages of development should not be selected for study in the problem here considered. D. W. J.

CHANGES IN SEA-LEVEL.—H. W. Pearson gives an interesting discussion of changes in sea-level due to actual changes in the level of the ocean rather than to continental oscillations (Deformation and Variation in the Sea-Level, *Geological Magazine*, IV, 1907, 115-121). After calling attention to Playfair's law, that the ocean cannot rise or fall permanently at one place without being similarly affected everywhere, the author points out the fact that, in accordance with this law, we are accustomed to explain changes in the relative elevations of sea and land as due to actual changes in the level of the land, since the changes are not uniformly the same the world over. The propriety of such interpretation is questioned on the following ground:

According to Ferrel's law of deformation of sea-levels by ocean currents, continental masses having an ocean current impinging upon them have shore-lines higher than the average elevation of the ocean surface, due to the piling up of the waters thrown against them; while masses away from which the currents are moving have shore-lines similarly depressed. Differences in the elevation of the ocean surface in different parts of the world, due to this cause, may amount to as much as five or ten feet, or possibly more. Changes in the direction or velocity of ocean currents would result in a change of the level of the ocean surface adjacent to continental masses, which changes, not being uniform the world over, would be interpreted according to the present custom as due to land movements. There is evidence that such changes in the direction and velocity of ocean currents do take place, and that in consequence Playfair's law is not valid, some at least of the differential movements attributed to continental oscillations being really due to oscillations in the level of the sea.

The principle here discussed is of interest and value in connection with comparatively slight changes in the relative level of land and sea, and should not be lost sight of in considering apparent uplifts and depressions now in progress along the coasts of New Jersey, New England, and elsewhere. It is difficult to see how it would apply to changes in past time amounting to hundreds, and even thousands, of feet. This the author does not seem to appreciate when he dismisses the apparent motions of the earth's crust as founded on fallacious reasoning. It would seem that Ferrel's law modifies, rather than destroys, Playfair's law. Accordingly, it is not possible to sympathize with the author's feeling that Playfair's law has long put a bar upon progress, and that no man has heretofore had the courage to question its correctness. Nor will it be generally agreed that "the argument so long unassailable fails us; we find it weak, erroneous, impotent."

D. W. J.

MR. ALBA B. JOHNSON has been elected President of the Geographical Society of Philadelphia for the ensuing year.

DR. ALBERT E. JENKS, author of "The Bontoc Igorot," has been promoted to the position of Professor of Anthropology in the University of Minnesota.

MR. LAWRENCE MARTIN, who assisted Prof. Tarr in his geological studies in the Yakutat region of Alaska two years ago, has been promoted from assistant to Instructor in Geology at the University of Wisconsin.

DR. ALBRECHT PENCK, Professor of Geography in Berlin University, has been elected a foreign member of the Academy of Sciences, Copenhagen.

AMONG valuable features of the *Agricultural Journal* of the Cape of Good Hope are the monthly notes on the weather, prepared by Mr. Charles M. Stewart, secretary to the Meteorological Commission. The notes for February, for example, tabulate the rainfall data from 347 stations, giving averages for each of the eighteen districts of the Cape of Good Hope; also describe the main features of precipitation and temperature, cloud, and wind conditions and give tables of maximum and minimum temperatures, and the total quantity of rainfall at each of the reporting stations.

MR. FRANCOIS E. MATTHES of the U. S. Geological Survey, is now Inspector of topographic surveys for the western United States. Mr. Matthes's new map of the Yosemite Valley will be published some time this summer.

MR. CHARLES C. ADAMS, of the University of Cincinnati, has resigned the directorship of the museum of the Cincinnati Society of Natural History.

MR. EUGENE GALLOIS has been sent by the Paris Society of Commercial Geography to South America to make economic investigations in the Pacific Coast states, Bolivia, Argentina, and Paraguay. In Brazil he will give special attention to the coffee region.

A LONG ARTICLE by Mr. A. U. Voeikov in the *Izvestiya* of the Imperial Russian Geographical Society (Vol. XLII, 1906, Nos. 2-3), on "Distribution of the World's Population in relation to Natural Conditions and Man's Activities," is accompanied by a series of Mercator charts showing the world's density of population, the percentage of total population living in the towns, the imports and exports of breadstuffs, with chief trade routes of cereals, distribution of the production of the important breadstuffs and regions of emigration and immigration.

THE "Almanaque Brasileiro Garnier" for 1905-1906, published at Rio de Janeiro under the direction of B. F. Ramiz Galvão, has been received. The annual contains news and information concerning the progress of Brazil, the several States, the public men, etc. Maps of States and of railroad lines, photographs of public men and views of cities and towns are given.

THE *Rivista Geografica Italiana* (April-May, 1907) has a bibliography (72 pp.) of the Italian colony of Eritrea for the years 1891-1906.

THE lectures on the "Peoples of the Philippines and the Ethnology of Malaysia," recently given by Dr. David P. Barrows at the University of California, were the first regular courses of instruction given at any American University on the ethnology of those regions. Dr. Barrows will sail in July to resume his work as Director of Education in the Philippine Islands.

THE next International Geological Congress will be held in Stockholm in 1910.

DR. G. VON NEUMAYER'S library, numbering 10,000 volumes, is to be added to the library of the Gymnasium at Speyer, which contains the largest book collection in the Pfalz.

OBITUARY.

MARCEL BERTRAND, Professor in the School of Mines, Paris, died on February 1st, aged sixty years. For twenty years he had been regarded as one of the foremost geologists, and his studies relating to the origin of mountains and to dynamic geology in general profoundly influenced the science of physical geo-

graphy and led to important advances in the technique of mining. He succeeded Pasteur in 1896 in the Academy of Sciences.

DR. ALEXANDER BUCHAN, F.R.S., died in Edinburgh on May 13th, aged seventy-eight years. He won distinction in the field of meteorology and was a large contributor to the literature of that subject.

NEW MAPS.

AFRICA.

DAHOMÉY.—Carte Indiquant la Distribution des Mouches Tsé-tsé au Dahomey. *La Géographie*, No. 3, 1907.

A sketch map showing twenty comparatively small districts in Dahomey where the tse-tse fly is found. The fly affects the distribution of domestic animals and imported horses and cattle are usually acclimated with difficulty or cannot live where the insects are found. The map illustrates a study on these flies in Dahomey by Mr. Henry Hubert. As the insects are met with only in small areas, Mr. Hubert's investigations may encourage efforts to exterminate them.

EGYPT.—Egypt. Scale, 1:50,000, or 0.7 statute mile to an inch. Sheets: I-II, N. E.; III-III, N. E.; XIV-II, S. E.; XV-I, II, S. E.; XVI-II, III, S. E.; XVII-II, III, IV, S. E.; XVIII-III, IV, S. E.; XIX-III, IV, V, S. E.; XXX-VIII, S. E. Survey Department, Cairo, 1906.

The Survey Department is making rapid progress with this topographic map of Egypt on a scale of 1:50,000. One of the most notable features of these sheets is the complete information they give concerning the water supply and drainage canals. The finished map will give a complete view of the irrigation development in Egypt. The hydrography, including the canals, is in blue, the names and all cultural features, excepting the canals, are in black, the hills are brown, and the desert white with thin, brown stipple.

IVORY COAST.—Reconnaitssances effectuées en 1904, 1905, et 1906 dans la Haute Sassandra. By Administrator Thomann. Scale, 1:500,000, or 7.8 statute miles to an inch. *Bull. of the Committee of French Africa*, Paris, May, 1907.

This black-and-white map shows the surveyed course of the upper Sassandra, but indicates only the approximate courses of its tributaries. It gives a large number of place-names, but no relief features. The map is the outcome of the diligent researches by Mr. Thomann, described by him at length in *Renseignements Coloniaux* No. 2, 1907.

NORTHERN NIGERIA.—Karte des Gebietes zwischen Ibi und Yola. Scale, 1:750,000, or 11.84 statute miles to an inch. By H. Marquardsen. *Pet. Mitteil.*, Vol. 53, No. 5, Gotha, 1907.

Most travellers have used the Benue water route between Ibi and Yola, with the result that the region between this river and the Cameroons boundary has been little known. The map records the data collected by Captain Marquardsen in this territory. He shows his route and the tracks of earlier travellers and indicates the forests, grass and bush lands, cultivated areas, trigonometrical points, mountains, etc., on his route. Figures show approximate heights above sea-level.